

Nov 11-11:49 AM

### 6.5 Construct and Apply Exponential Models

p. 378- 389

Example 1 p. 380

**Simple and Compound Interest**

Edgar has \$500 to invest and is considering two investment options.

- Option A:** A treasury bond that pays 8% simple interest. The amount,  $A$ , after  $n$  years is given by the equation  $A = 500 + 40n$ .
- Option B:** A savings account that pays 6.5% per year, compounded annually. The amount,  $A$ , after  $n$  years is given by the equation  $A = 500(1.065)^n$ .

- Graph each relation on the same set of axes. Describe each relation.
- Compare the options. Which is the better investment? Why?

Mar 24-11:12 AM

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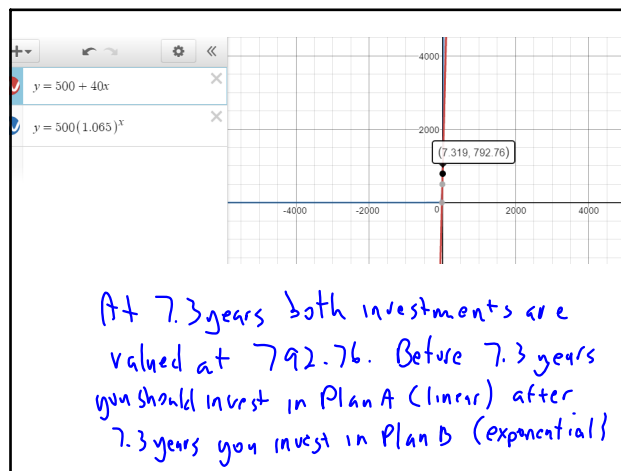
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Examine Using the Graphing Calculator  
Interpret the Pt of Intersection

After 7.3 years the Compounded Savings account is the best option. Before 7.3 years the Treasury Bond is the best option.

(7.3, 792.96)

Mar 24-11:12 AM



Nov 11-12:05 PM

Example 2 p.381 Using Exponential Regression

**Winning Times for the 100-m Dash**

The table shows the Olympic winning times for the men's 100-m dash.

Year	Time (s)	Year	Time (s)
1896	12	1960	10.2
1900	11	1964	10
1904	11	1968	9.95
1908	10.8	1972	10.14
1912	10.8	1976	10.06
1920	10.8	1980	10.25
1924	10.6	1984	9.99
1928	10.8	1988	9.92
1932	10.3	1992	9.96
1936	10.3	1996	9.84
1948	10.3	2000	9.87
1952	10.4	2004	9.85
1956	10.5		

$y = 0.003x^2 - 0.14x + 11.5$   $R^2 = 0.96$

- Construct a scatter plot of the data. Describe the trend.
- Develop an appropriate mathematical model for predicting future performance.
- Use your model from part b) to predict the winning time for the 2020 Olympics.

2020 = 10.04

Apr 16-7:34 AM

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a) -ve rel'n i.e. As time increases 100m time decrease

b) Regress Linear, Quad, Exp

Exp - highest  $R^2$  value.  $\therefore$  best fit

c) Year 29 ~ 9.46

Apr 16-7:34 AM

**Key Concepts**

- Linear relations increase or decrease at a constant rate; the first differences are constant.
- Exponential relations increase or decrease by a constant ratio; the percentage changes are constant.
- A relationship between two variables can be modelled. The model can be linear, quadratic, exponential, or some other type of curve. A good model will not only fit the data well, but will also be useful for making predictions beyond the given data.

Hmk. p. 385 -389  
q. 1-5, 7 & 9\*

Apr 16-7:38 AM

Mar 8-7:37 AM